

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Amendment to specification

Applicants have amended the specification to correct typographical errors identifying the gate conductors in the drawing figures. Gate conductors are correctly identified as item 30 in paragraphs 0026 and 0028. No new matter has been added.

Cancelled non-elected claims

Applicants assume that the restriction requirement of the August 10, 2004 office action has been made final and, accordingly, have cancelled non-elected claims 15-31 without prejudice.

Allowed and allowable claims

Applicants express their appreciation for the allowance of claims 10-14. Claims 4 and 7, which were indicated as being allowable if rewritten to be in independent form, have been amended to incorporate the limitations of claim 1 upon which they were dependent. Claims 5 and 6 are also believed to be allowable since they are dependent on claim 4.

Rejection under 35 USC § 103

Claims 1-3, 8 and 9 stand rejected under 35 USC § 103 as being obvious from Mandelman et al. U.S. Patent Publication No. 2002/0085434 in view of Mandelman et al.

U.S. Patent No. 6,440,872 further in view of Benedict et al. U.S. Patent No. 6,046,487. Applicants respectfully traverse this rejection.

Claim 1 of the present invention defines an integrated circuit device having a nitride liner adjacent the isolation regions that extend below the gate conductor on either side of a dynamic random access memory (DRAM) cell. As amended, the claim recites that the nitride liner extends to the oxide trench collar of the storage capacitor of the DRAM cell, which is below the strap diffusion region adjacent the capacitor. Support for this amendment is found in the specification at paragraphs 0024 and 0026 and in the drawings at Figs. 1 and 3. No new matter is added.

The Examiner has cited as the base reference the Mandelman '434 patent publication. Mandelman '434 (for which one of the inventors is also a co-inventor of the present invention) discloses a memory cell structure in which "[s]hallow trench isolation regions extend along a surface of the substrate in a direction transverse to the sidewall where the vertical transistor extends." Mandelman '434, para. 0003. However, there is no disclosure of how deep these shallow trench isolation (STI) regions extend, and, in particular, whether they extend below the DRAM cell gate or to the trench collar of the storage capacitor.

In combination with Mandelman '434, the Examiner has cited the Mandelman '872 patent, which discloses a hybrid memory cell array. Mandelman '872 states "[i]n accordance with the present invention, each shallow isolation trench region has a depth that is substantially above the one-sided buried-strap outdiffusion region thereby not cutting into the one-sided buried-strap outdiffusion region, yet being deep enough to

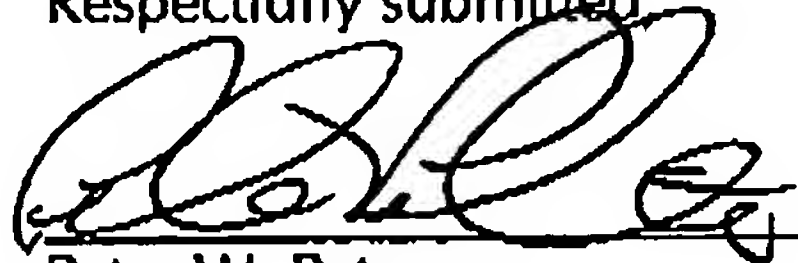
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isolation adjacent bitline diffusion regions that abut each vertical memory cell." Mandelman '872, col. 4, lines 29-36. The Examiner also cites Benedict for the disclosure of a nitride compound liner for shallow trench isolation. However, Benedict does not disclose the use of its STI with a DRAM cell.

The cited art does not disclose applicants' disclosed embodiment where the nitride STI liner adjacent a DRAM cell extends below the gate conductor to the oxide trench collar of the DRAM cell storage capacitor, below the strap diffusion region. The Mandelman '434 and Benedict references make no disclosure of the extension of a nitride STI liner to this extent, and the Mandelman '872 reference teaches that the shallow isolation trench depth that is substantially above the one-sided buried-strap outdiffusion region. Accordingly, applicants submit that the instant invention as defined by claim 1 is not obvious from the cited prior art. The remaining rejected claims, nos. 2, 3, 8 and 9, are all dependent on claim 1 and are therefore also not obvious.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted



Peter W. Peterson
Reg. No. 31,867

DeLIO & PETERSON, LLC
121 Whitney Avenue
New Haven, CT 06510-1241
(203) 787-0595
ibmf100406000amda.doc